University of Wales, Newport
Prifysgol Cymru, Casnewydd

Newport CELT Journal
2009, volume 2, pp. 52-62
ISSN 1758-9258 (print)
ISSN 1758-9266 (online)
http://celt.newport.ac.uk/journal

Extent of e-learning effectiveness and efficiency in an integrated blended learning environment.

Shafqat Hameed[1], Kamaran Fathulla[2] and Andrew Thomas[1]

[1]Newport Business School, University of Wales Newport, Allt-Yr-Yn Campus, Allt-Yr-Yn Avenue, Newport, NP20 5DA, United Kingdom. Email: shafqat.hameed@newport.ac.uk
[2]Northampton Business School, University of Northampton, Northampton, NN2 7AL, United Kingdom.

Summary

Technology-enhanced learning or computer aided learning (e-Learning) can be institutionally integrated and supported by learning management systems or Virtual Learning Environments (VLEs) to offer efficiency gains, improvements in effectiveness and scalability of the e-learning paradigms. The aim of this study was to investigate the relative effectiveness of the application of a pure e-learning approach compared to the application of a blended learning approach to subject delivery. The blended learning approach constituted a managed mix of e-learning methods, traditional instructor led methods and other blended learning methods. The evaluation framework criteria (i.e. process improvement, quality of experience and physical and/or virtual participation), as applied to the empirical results, concluded that blended learning, which is augmented with social networking, co-learning and knowledge co-creation support systems, shows the highest potential for adding value to the learning experience when compared to e-learning only methods of subject delivery. The study will provide a comparison between purist e-learning and blended learning environments. The paper also provides directions for blended learning environments that can be used by all the three main stakeholders (student, tutors and institution) to make strategic decisions about learning and teaching initiatives. The paper concludes that blended learning approaches offer the most flexible and scalable route to e-learning.

RESEARCH PAPER

Keywords: e-learning, Technology, Education, Student, Institutions, Training.

Introduction

Technology-enhanced Learning or e-learning can be a progressive internet-enabled tool, in a global marketplace where knowledge has become the single greatest economic asset. The role of computer communication in virtual learning environments is very important, which could include the creation of digital media, mobile media and e-commerce. Malala (2004) claims that most institutions have already decided to use the web as an alternative mode to instructor led mode. Although this is arguable, there is lot of discussion about web based courses, mobile learning media and other issues related to virtual learning environment and it is quite clear that many have already familiarised or adopted virtual learning environment in some capacity (Malala, 2004). Most, if not all, universities in the United Kingdom (UK) have a dedicated department of e-learning and some universities are offering postgraduate qualifications via their virtual learning environments. Some universities are even offering postgraduate qualifications in e-learning to produce graduates with specialised e-learning skills i.e. MSc in e-learning at the University of Edinburgh. There is a sense of anticipation that web-based education is initiating a revolution among institutions of Higher Education.

Marketing competition between universities exist due to the open access to a wide range educational opportunities caused by globalisation (Malala, 2004). Due to competition students are becoming more critical of the quality of education they are receiving. Students enrolled on e-learning courses want to make sure that they are receiving the best training from highly qualified instructors, most of whom they will never meet face-to-face. Hence, in the absence of physical and visual cues, students in a virtual learning environment have to heavily rely on other psychological and sociological stimuli (e.g. diplomas, instructors, industry, background, research, publication, school accreditation, certification, etc) to validate their perception of quality and efficacy (Malala, 2004). This leads to the question of how effective and efficient e-learning is and whether students would be sufficiently equipped to enter into employment after completing their education just through an e-learning mode of study. Students have high expectations and are concerned about the quality of training and education

they receive. Students want to learn, gain knowledge, improve skills and want it to represent value for money. Does e-learning provide all these and if not do we then have another solution which may provide all these and fulfil students' expectations?

It is important to determine the factors that affect students' perception of quality of education while using e-learning. The two stakeholders, academic institutions and tutors must address these issues to satisfy the third stakeholders' students before deploying any virtual learning environment. No matter how good the e-learning environment is and what best technology is used to create it, if students are not satisfied then it is of little use.

The main focus of this research is to determine how effective and efficient the e-learning approach is when deployed on its own and again when integrated within a blended learning environment. It identifies the differences in student learning achievement between two groups of students. One group being exposed to e-learning only and the other group exposed to a blended learning environment. The primary objective of this study is to address the following main research question:

"How effective and efficient is e-learning when integrated and routinised within a blended learning environment to improve the learning and teaching process."

Routinisation and Integration Challenges

There is a recognisable trend towards a strong co-operation between the fields of traditional learning and e-learning and there are ways to narrow the gap between these two fields when deployed within a blended learning environment. Such integration has the potential to improve and change today's understanding of education towards lifelong and creative learning. This integration also requires using all the resources available in an organisation as learning and teaching material. This of course requires structuring the material into relatively small fragments, which can then be combined into bigger objects in the preferred way. The other aspect relating to the depth of integration is the degree by which a particular practice given a mix of traditional and e-learning becomes embedded in the customary ways of doing things. In the university as a mature process that is widely practiced and is thus routinised and thereby incrementally evolved and made more effective and efficient (Malone, 2003).

Perhaps the phrase "the best technology is one that is least noticed" would help highlight the sense in which we refer to routinisation in this paper. Routinisation as a concept, relating to the high usability of a system, is defined as the degree to which a solution system is adopted and adapted by users as an integral i.e. fully embedded part of their everyday work-style or life style. For example, a mobile phone is a routinised item in respect of its appropriation by many people as a full, natural and intimate device accompanying their daily work or living activities, facilitating communication in a new routinised way such that never existed prior to the introduction of the mobile phone as a solution system. Thus, when we refer to the routinisation of e-learning, as it is expected to occur in blended learning, for example, clearly what we mean is that state can be attained whereby the practitioners could adopt and adapt e-learning as a natural complement to their routine, everyday practice of teaching and learning; thus, appropriating it a routinised role. Therefore, when we speak of a solution system that is routinised, it is taken for granted that a system has high usability features, is customisable, and has therefore found significant take up and diffusion through adoption and adaptation by users i.e. technology that is well accepted and appropriated by the target user community and is, thus, routinisable and routinised.

There is no single method or model of teaching and learning. Different factors such as learning conditions of the target learners, the courses and the institutions needs to be defined and analysed before choosing any particular mode of teaching and learning. Most students prefer a combination of face to face and e-learning (Ingeborg, 2005). Traditional or face to face learning is considered important for motivation, cooperation, social support and personal support in the subjects where personal relations and oral competence is important. But for students who want to work independently with their own pace and want to communicate to large community of students or teachers who are living in different places, e-learning is considered excellent mode of learning and teaching (Ingeborg, 2005).

An appropriate balance between traditional learning and e-learning is very important when integrated within a blended learning environment. Students value the collaboration and integration between the traditional learning and e-learning courses. They value the face to face interaction with the tutors in traditional learning and they also value their involvement with material in e-learning, which is much greater in e-learning than it tends to be in traditional learning. The efficiency of this kind of integration within blended learning is also very important for students (Laurillard, 2001).

There are two generations of e-learning. The first generation approaches were quite effective to develop technical skills but the same approach has not been very effective in developing soft or management skills. The question is whether e-learning has been routinised between these two generations and developed into a regular procedure. This paper will consider these routinisation challenges and will investigate the regular developing procedure of e-learning. Has the second generation solved the problem, and is there a way to use e-learning effectively for the development of

management skills, or it has to be integrated into a traditional learning environment within blended learning environment to achieve those goals.

The current role and state of e-learning

The World Wide Web has fascinated academic institutions around the world and provided a potential for a new medium to deliver courses to people, who live far away from the institution, in the form of the text, audio and video without the need of adding new buildings or hiring new instructors (Malala, 2004). The majority of the academic institutions accepted e-learning as an alternative to the traditional classroom teaching without any stiff resistance. The acceptance rate has been rapid and widespread (Malala, 2004).

Teachers and professors who have a growing interest in technology and computing show great interest in online teaching and learning. They show determination to invest time and resources to discover the complexities of e-learning to make it a universally accepted theory. In every university almost every teacher is making effective use of technology and transforming some or all of the existing course material into the e-learning environment. There is a growing number of online courses around the world. Not just the universities but many private companies are making use of e-learning to provide training courses. Malala (2004) argues that with the increase in course offerings, there is an increase in research interest and other scholarly pursuits from both the corporate perspective and the academic standpoint. Almost every field of interest is making use of e-learning in one way or another. According to Sonwalkar (2002) "*most universities and corporate trainings facilities now offer some or all of their courses online*". Universities around the world offer all sorts of courses in e-learning these days from IT, business, medicine and sports.

The literature related to this topic demonstrates that all the academic institutions as well as industry is implementing e-learning in every field at a very fast pace. Today there is hardly any university in UK that does not offer some kind of online learning and teaching in the form of e-learning (Malala, 2004; Hameed *et al*., 2007)

Background of E-Learning

Human computer interfaces are of course an integral issue in designing e-learning packages. Much research has explored the design of advanced interactive systems to provide for a high quality user experience. For e-learning it is important to develop advanced interactive spaces that enable users to evolve their own conceptualisations of the learning material and follow individualised pathways through interactive constructivist-constructionist learning with maximum learning autonomy unhampered by hard-wired learning styles and pathways. The advances in electronic communications, the Web and the Internet and associated technologies have motivated the widespread adoption of e-learning to improve access for learners to higher education and employee training in the workplace (Hameed *et al*., 2007).

Computers are now commonly used for storing and manipulating data to assess the student's performance. The same software and hardware can be used as a vehicle for teaching most of the computer-aided based courses. The educational material in an e-learning system has to be very carefully structured so that the student can follow a logical path through the lesson. E-learning systems have evolved into complex systems; so that it can often be difficult for a teacher/ developer to know the best regime to follow when starting to develop an e-learning system (Hameed *et al*., 2007). The beginning of electronic communications, the Web and the Internet and associated technologies have produced a change in which e-learning is seen as a means towards improving access for learners to higher education and improving employee training in the workplace.

There are two interpretations of e-learning implicit within the work in this paper. One definition is that of e-learning designated as predominantly or almost entirely enabled by online access to virtual learning experiences but without multi-modal, multi-media and/or social network support. This designation is used for the purpose of comparing and contrasting such a purist e-learning approach with the more advanced and modern characterisation of e-learning which is distinguished in this thesis as blended learning with social network support such as may be facilitated by Web 2.0 technology-enabled spaces e.g. IM, U-Tube, web logs, wikis etc.

E-learning is revolutionary and it is a time for a new and fresh approach. The main advantage of e-learning is that it focuses on the individual learner. The new approach of thinking of the learner as a customer has changed the whole process of learning. In the past training and learning was organised for the convenience and need of only two stake holders mainly instructors, institutions and ignoring the third and in some respect the most important one, a learner or student (Cross, 2003).

Blended Learning

Due to the disadvantages of e-learning a new approach "blended learning" has been developed. The basic concept of this is classroom based tuition will be combined with private study using interactive multimedia resources. There is evidence to show that this approach to teaching works. A blended curriculum, according to a two-year cross industry study by Thomson Learning, is far more effective at driving employee productivity than classroom training alone (Walmsley 2003).

Blended learning has gone through an evolution process of many years and different institution has given a different description of it. According to Mayadas and Picciano (2007) the main purpose of

blended learning for higher education establishments is to achieve a great sense of localness. Mayadas and Picciano (2007) define blended learning as a combination of face-to-face and online learning. In simple terms it is the combination of instructor led traditional learning and computer aided learning (e-learning) environments.

Sharpe, *et al.* (2006b) presented the following three ways of blended learning use.

- The provision of supplementary resources for courses that are conducted along predominantly along traditional lines through an institutionally supported virtual learning environment.
- Make use of technology to facilitate interaction and communication and replace other modes of teaching and learning.
- Students taking a holistic view of the interaction of technology and their learning, including the use of their own technologies

Blended learning comes in many shapes and types. As described by Picciano (2006) blended learning may be used to enhance the traditional lecture with additional readings, electronic instructor notes and images of charts, graphs, or other handouts in one course. In another course, online learning may be combined with face-to-face instruction so that rather than meeting in a classroom three hours a week, a course meets two hours per week with the third hour consisting of an online threaded discussion.

There are two core elements of blended learning (online and face-to-face instruction) and both are very critical in defining blended learning (Picciano 2006).

According to e-learning India (2007) blended learning model comprise of the following elements which are mixed in varied proportions to meet different organisation's requirements.

- Learning through information
- Learning through interaction
- Learning through collaboration
- Learning through classroom

This means that blended learning involves the appropriate blend of different components which includes courses, contents, feedback, and many other things. This means that the blended learning can solve the ubiquitous problems associated with most e-learning models such as speed, scale and impact (e-learning India 2007).

According to Picciano (2006) blended learning in the broadest sense can be defined or conceptualized as a wide variety of technology/media integrated with conventional, face-to-face classroom activities. But to be specific blended learning is a blend of fully online and face-to-face instruction. Figures 1 and 2 illustrate this concept.

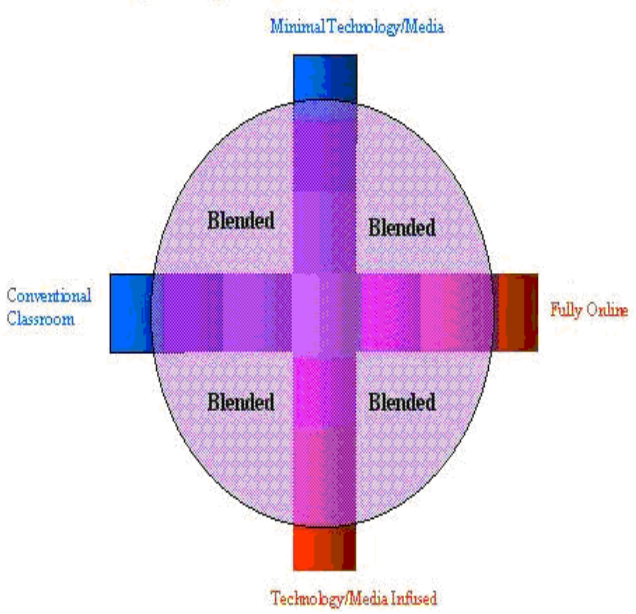

Figure 1. Broad conceptualization of blended learning (from Picciano, 2005, 2006).

Figure 2. Online-specific conceptualization of blended learning (from Picciano, 2005, 2006).

An example of the benefits of this approach can be seen in a case study of Express Personnel (2004). They found that managers could benefit from online material about the principles of hiring, but needed classroom instruction with role-playing to learn those skills. When personnel go to one of the company's training centres, they learn a lot from other people doing the same job at a different location. These kinds of skills cannot be packaged in an online course. According to Mullich (2004) Studies conducted by Harvard Business School have shown that a "blended learning" approach enables employees and students to learn five times as much material at one-third the cost of a classroom-only approach. Surveys indicate that students and employees overwhelmingly liked the blended approach better (Mullich 2004).

Without the "blended learning" approach, e-learning courses can be harder to teach and opponents argue that they demand a greater time commitment on behalf of the teacher:-

"In terms of organising and planning, everything has to be explicit. Materials must be prepared in advance and made available" (Kling, 2003).

There can be difficulties with intellectual property rights. Arthur Miller, a Harvard Law Professor, was hired by Concord University as a consultant. Concord used videotaped lectures that Miller had filmed at Harvard. Harvard Law School requested that Miller give up his consultancy position. Miller comments,

"They are worried about the Harvard Trademark, and they seem to be saying I am reducing it by allowing some of my materials to be used at Concord Law School"

Online education is still facing problems with branding and accreditation. Although there has been a growth in online degrees and they are more acceptable, there is still a general perception that they are second-rate degrees (Kling, 2003).

According to Klein (2003) there are of course a number of technical limitations to course delivery, most notably the requirement for broadband access to the Internet and a personal computer with a relatively high specification. Another limitation is the development of e-learning courses as viable commercial products. Courses are often expensive to develop, especially ones that utilise some form of interactive case-based learning, yet are targeted at specialised audiences (Klein, *et al* 2003).

One of the most important technical limitations on e-learning is the shortage of competent web authors. Unlike an ordinary author, a web author has to have the skills not only to write a successful web-based training course but he must be familiar with the new learning technologies and develop skills to make his course lively and engaging, clearly it is not easy to find authors who have this combination of skill and talent (Klein, *et al* 2003).

There are both companies and individuals who strongly oppose e-learning. Individual resistance can be fairly common in the older generation, often the main target of e-learning initiatives. It is thought that is partly because e-learning is so similar to the normal working environment and it does not provide the necessary level of stimulation for learning to take place. Many people are wedded into the idea that you must go away and attend a training course.

"We have found that IT people have bought into the idea of e-learning providing the fundamentals, but when more complex issues about the application of learning are concerned, we realise that an external tutor is needed to provide the necessary interaction and the benefit of others' experiences."(Beckett 2004).

One cannot hope to technologically reproduce every aspect of the proactive, pedagogical engagement of a good teacher. Indeed, since such teaching relies in some part on a complex human relationship between the teacher and the student, one is ill-placed to attempt to emulate it; but such a privileged relationship is of course to be facilitated as best as possible with the aid of technology-enhanced multi-modal engagement of both sides as it occurs in blended learning approaches to pedagogic management in which an appropriate eclectic mix of teaching interactions, spaces, content, media and tools can be deployed to achieve the learning objectives. Thus in blended learning, technology is seen as being possibly useful in supporting face-to-face teaching, enabling students to interact with learning material in their own time and place, i.e. asynchronous to the constructivist tutor-assisted teaching sessions. Figure 3 explains the process of learning for all the three stake holders in the process of adopting blended learning environment.

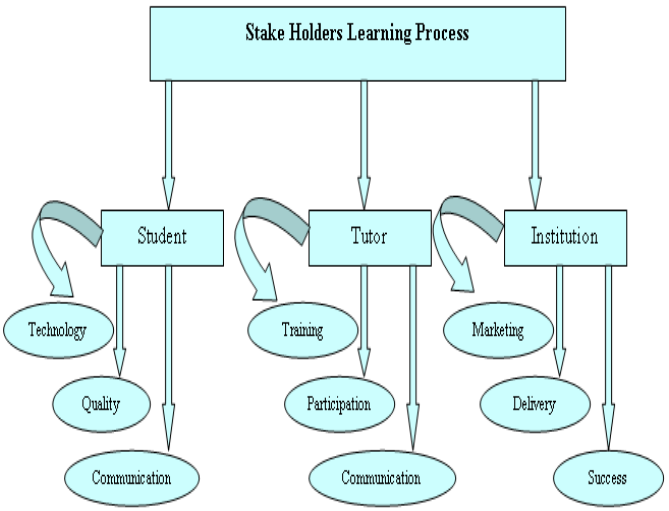

Figure 3. Learning process for all the three stakeholders.

The use of Pedagogical Content Knowledge *(*PCK) to mediate blended learning fits well within the existing e-learning content interoperability framework as PCK deployment is based on open content. SCORM (Sharable Content Object Reference Model) (IMS Global Learning Consortium, 2003) describes a specific way to deliver e-learning content such that it is re-useable, shareable, durable and accessible (Badii and Mothersol 2007).

There is evidence which indicates that in certain circumstances e-learning may enable students to work at their own pace and personalise the direction of their learning. Potentially, the Internet is a resource which enables students to communicate and access data in different media forms. Optimistically, web-based technology may provide a learning infrastructure, with features considered vital within the constructivist theory of learning: namely, students belonging to a "community of learners", co-constructing knowledge using societal artefacts and tools (Badii and Mothersol (2007).

Research Methodology

The aim of the study was to measure the extent to which e-learning influenced the effectiveness of student learning in an e-learning only and a blended

learning environment. The hypothesis was therefore to see whether the blended learning approach achieved better student feedback results.

Two hundred postgraduate students studying a systems analysis module were chosen. A group size of 200 was chosen because it provided a suitable sample size which would be considered statistical significant and this happened to be the taught group size and so nobody on the programme had been left out of the assessment. The group was exposed to two semesters of study. In semester 1 the students were exposed to an e-learning only environment. Following the period of study the student group were assessed on the course material. In semester 2 the group was exposed to a blended learning method of delivery which consisted of face to face teaching with online support. Again the students were assessed on completion of the semester. The assessment consisted of a multi method approach combining closed and open ended questions in the form of a questionnaire. The questionnaire was delivered in the class and was also available online. 150 students decided to answer the in-class questionnaire whilst the other 50 decided to respond on-line. All 200 students responded and no questionnaires had to be discarded or destroyed.

A five point Likert-type scale was used for closed ended questions. The aim here was to measure the degree of learning that was achieved by the individual students. The scale asked the respondent to provide a mark of 1 if they strongly disagreed to a particular question up to a mark of 5 if they strongly agreed to a given question. The open ended part of the questionnaire asked the respondents to describe their experiences of using both teaching and learning methods.

Assessment framework for teaching and learning under different approaches

1. Process Improvement in terms of teaching and learning efficacy as measured by appropriate tests and evaluations
2. Quality of Experience of the stakeholders, particularly teachers and learners
3. Level of stakeholder participation in the virtual and physical spaces as a further evidence of i) and ii) above.

Results

The purpose of this experiment was to identify the differences of learning achievement between two groups of people who are exposed to e-learning and blended learning environment. The results are shown in Figures 4-7.

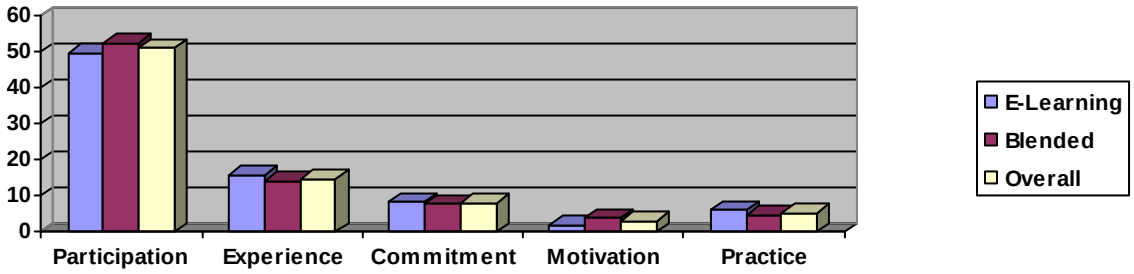

Figure 4. Factors for improvement in learning.

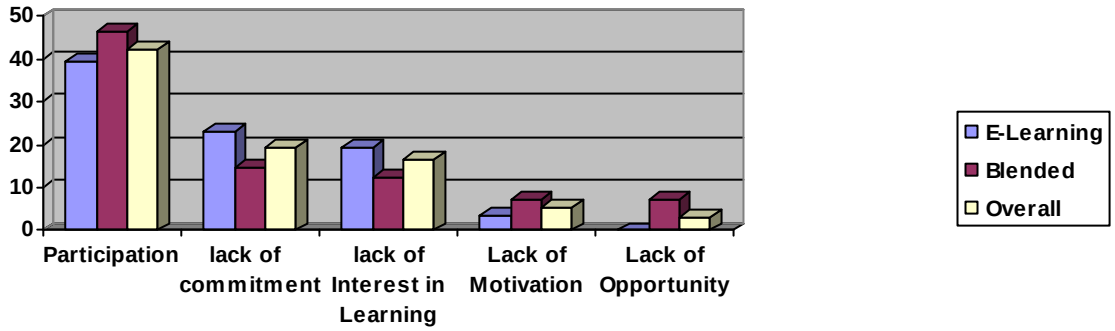

Figure 5. Factors for non-improvement in learning.

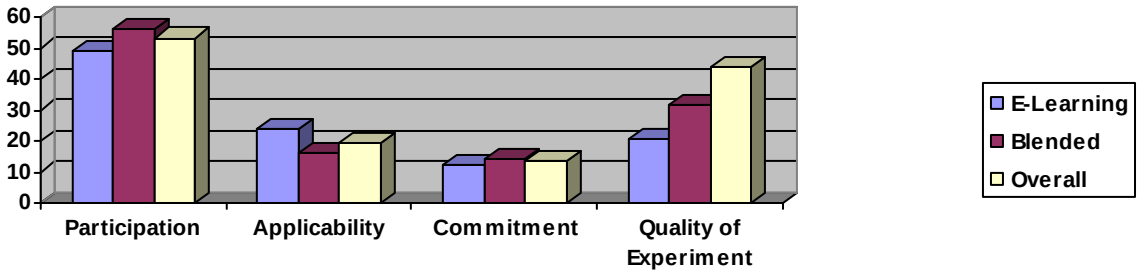

Figure 6. Factors contributing to high learning achievements.

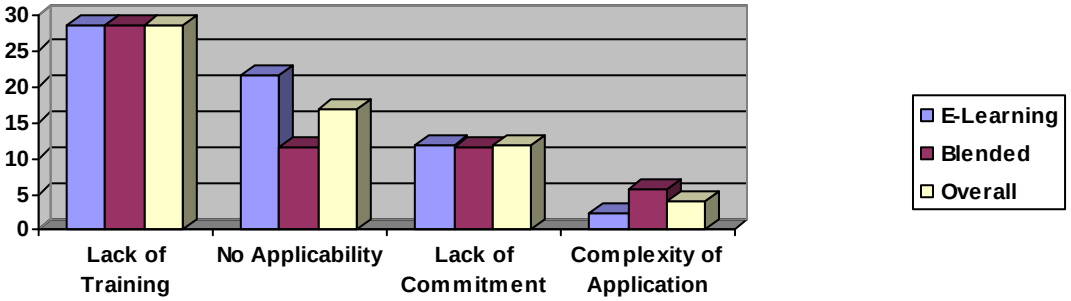

Figure 7. Factors responsible for low learning achievements.

The most important factor for learning is considered to be the teaching method design and its effectiveness. Teaching method ineffectiveness can lead to poor performance from the students. Students in blended learning mode expressed an experience of more learning in classroom discussion, assignments and personal interaction with tutors than the students in e-learning who solely relied on online contents.

It was found from the gathered data and analysis of the data that there were no significant differences between both the groups in e-learning and blended learning mode in terms of the learning achievement. From this it can assume that delivery mode may not affect students learning to a significant degree.

The research conducted by Lim *et al.* (2007) revealed that the students in e-learning mode reported more workload than the students in blended learning mode. This was also the confirmed in this experiment as the students had lot of things to do in a very short period of time with no feedback at the beginning and middle stages of their work which led to a lack of motivation. e-learning students relies solely on the online material so there was less support for them than the blended learning students who also had the opportunity to meet their tutors face to face (Lim *et al.,* 2007). The finding suggests that collaboration is an important factor in both the learning modes to enhance the students' engagement with peers and instructors. This experiment also suggests various recommendations for the two stake holders, academic institution and instructors to provide best learning environment to the third stake holder students. The recommendations also confirm the strategies of Lim *et al.* (2007). The recommendations are

- Instant and Fast Response
- Fast technical support
- Providing students with the progress report on their achievement (Lim *et al*, 2007)
- Making environment more dynamic and robust

Blended learning mode seems to be better in providing instruction and support to the learners than the e-learning mode (Lim *et al.*, 2007). E-learning students face more hardships, challenges and problems than the students in blended learning mode (Lim *et al*, 2007). One of the reasons for that is due to complete unavailability of the instructor in e-learning mode to provide fast response or feedback and answer any critical questions. e-learning students also claimed that there lack of understanding with the technology and contents were a factor led to the low learning than the blended learning students. The results also suggest that blended learning mode is clearer and learner centered than e-learning mode. Lim (2004) also emphasised on the clarity of instructional resources in e-learning.

Different teaching and learning methods such as group discussion, group assignments, class assignments, class discussions are considered the most effective learning activities for learners and all these are best practice in a blended learning environment than just in e-learning. It is clear that blended learning is more important and is here to stay. Blended learning, whether it occurs within a course or a certificate or a

degree, offers both the University and students increased flexibility (Lim *et al.*, 2007; Lim, 2004; Hameed *et al*., 2007).

Assessment of Effects of Different Approaches to Teaching and Learning

As discussed above, a framework for assessment of the effects of different approaches to Teaching and Learning was envisaged as involving an improvement, or alternatively a decline, in the teaching and learning process efficacy as corroborated respectively by a either a heightened or a lowered Quality of Experience (QoE) with associated Physical Participation Evidence or Virtual Participation Evidence of the stakeholders as appropriate.

With respect to the above dimensions of analysis of influences of different teaching and learning approaches on the resulting teaching and learning experiences our findings have permitted the following overall assessment:

1. With purist physical or traditional learning approaches such as un-augmented traditional instructor-led teaching and learning the learning efficacy is relatively low consistent with a relatively low Quality of Learner Experience and consequent mixed patterns of physical participation by the stakeholders and of course no virtual participation by them.

2. With purist e-learning, i.e. with an approach to teaching and learning that relies solely on online access to teaching material, the findings suggest a mixed pattern of process efficacy improvement over that obtainable through traditional approaches as in II above. This is also associated with mixed patterns of Learner satisfaction (QoE) and relatively low take-up of virtual space participation by the stakeholders and of course no physical participation

3. However with Blended Learning which can be viewed as either traditional class-room learning (I) or e-Learning (II) but augmented with multi-modal and multi-media support allowing a fluid responsive interleaving of various teaching and learning approaches and spaces (physical and virtual), the learning process efficacy can be higher thus resulting in a higher Quality of Experiences of both teacher and learner which in turn are associated with higher physical and virtual participation evidence.

If technology-enhanced learning or e-learning is to be deployed on a mass-accessible scale then the required software platforms for multimedia production, distribution and personalised delivery of learning materials must represent a gracefully integrated accommodation of the various pedagogically relevant models, plus multi-modal and multi-media capabilities that underpin the vision of a socially mediated blended learning experience as depicted in Figure 9.

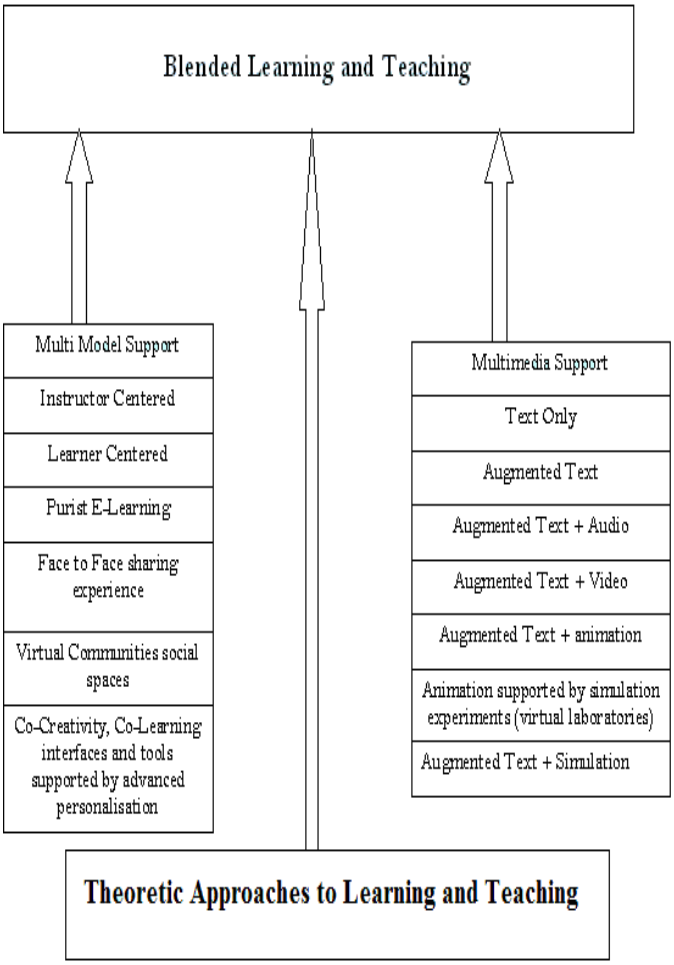

Figure 8. The Supportive Environment for Blended Learning and Teaching.

Theoretical models are important because they provide frameworks within which practice models can be evaluated – especially in relation to the learner experience (Beetham, 2007). According to Lally and Laat (2003):

"*No single theoretical model, among those currently available, is a sufficiently powerful, descriptively, rhetorically, inferentially or in its application to real contexts, to provide a framework for a research agenda that takes into account the key aspects of human agency*".

Model is a problematic term, and is used differently by users, researchers and developers of e-learning. Different users will require different models or modelling frameworks for representing e-learning. For users models encapsulate an approach to learning and for researchers they are a way of explaining or

exploring what happens in the learning context. Theoretical models are usually more difficult to define, generalise about, and compare than practice models, as they reflect competing theoretical commitments (Beetham, 2007).

A blended learning environment is best supported through a fully flexible provision that allows the delivery of learning experiences enhanced by a variety of singular or combined modalities of teaching and learning (e.g. teacher-led instruction, online learning) and their multimedia delivery (e.g. with single media or cross-media/simulation support) which may be selected dynamically by the learner and/or teacher at any time. A blended learning and teaching scheme may be understood in the context of one or more of the following theoretical approaches to learning and teaching:

1. The educational business models such as matching student ability and aspirations to course or programme of study.
2. The learners' individual learning preferences.
3. The pedagogic models to generate desired learning outcomes.
4. The discipline-specific delivery practice and discipline-specific assessment environments to provide an additional layer of support to motivate blended teaching and learning efficacy, autonomy, personalise-ability, ubiquitous availability and thus take-up.
5. A managed mix of learning modalities with multi model and multimedia support i.e blended learning.
6. Collaborative learning which includes socially mediated highly accessible multi-user environments and invitationally interactive models of e-learning.
7. Evolutionary discursive approaches.
8. Creative negotiation-centric models.
9. Models of added-value learning and learner retention.
10. Incentive maintenance that provide motivational momentum to keep re-enforcing best learning habits.
11. Learner autonomy support to encourage self-actualisation, enhanced self- esteem, personal satisfaction, efficiency gains and a sense of continuous personal achievement.
12. Enhanced autonomy in designing, adopting, adapting and experimenting with own teaching and learning strategies.

An underlying observation has been that for ICT-supported learning to be useful, it should support the teachers and learners with enhanced quality in continuing to achieve their teaching and learning goals i.e. acquiring and improving their knowledge faster, gaining experiential insight about the subject matter and correcting teaching and learning errors efficiently and effectively.

Essentially by reference to the evaluation framework set out in the methodology section to be deployed for comparative and contrastive analysis of the efficacy of various (e)-learning modalities, through invoking a relevant set of criteria such as *process improvement*, *quality of experience* and *physical and/or virtual participation evidence,* we can see that blended learning as augmented with social networking, co-learning and knowledge co-creation support shows the highest potential for adding value to the learning experience and learning efficiency gains as confirmed by this and other empirical research (Table 1).

	Observed Learning Process Improvement	**Observed Quality of Learning and Teaching Experience (QoLTE)**	**Observed Physical Participation Evidence**	**Observed Virtual Participation Evidence**
Traditional Instructor-led teaching and learning	Relatively Low	Relatively Low	Mixed	Insignificant
Purist E-Learning	Mixed Evidence	Mixed Evidence	Insignificant	Relatively High
Blended Learning	High	High	Higher	Higher
Blended Learning with Social Networking Co-learning & Knowledge co-creation Support	Highest	Highest	Potentially Higher	Highest

Table 1. Comparative and contrastive evaluation of the various e-learning modalities.

Finally, it is important to ensure that the learning is supported by some novel, fun-oriented and certainly invitational, if not provocative, tools and spaces that can intrigue and retain the attention of the learner and sustain a motivated interest to learn both alone and socially as and when appropriate. This is to support learner's self-perpetuating follow-through with learning and thus the establishment of self-fulfilling habits for life-long learning that, at their best, will almost always involve a personalised-balance, to suit individual learning styles, along the various dimensions such as solo versus group, instructor-led versus autonomous learning.

From an infrastructural standpoint there has to be an assumption of readily available and share-able multimedia learning resources and tools for selecting, accessing, enhancing and customising such resources as bundled learning objects or composites. These must be ubiquitously available to all teachers and learners through dedicated interfaces and spaces for selecting, sharing and choreography authoring of learning objects and their presentation flow management.

The fact that the take-up with collaborative tools such as seminars and discussion boards is not as high as it could be expected as observed in this and other research studies; confirms that there is still some work to be done to characterise e-learning as social blended learning as distinct from the traditional image of it as essentially there to serve solo distance learning - found to be dominant in the mindset of many students few of whom used the chat-and-share facilities for e-learning whilst downloading notes was the dominant form of support that they routinely expected to receive from e-learning environments.

As described by Khan (2001) the system currently in place for teaching and learning is a closed system which is a traditional instructor led teaching. This closed system is very rigid and resistant to change. This study shows that new developments in e-learning have been unsuccessful to change this closeness with a complete open approach to learning and teaching. It requires a mixed learning and teaching strategy in a blended learning environment with a consistent process improvement strategy. This work has provided new awareness on factors such as training, management, Multi Model support, Communications and Virtual communities etc which affects student's experience of learning satisfaction and tutors experience of teaching and institutions experience of facilitation the whole process in a blended learning environment. We present the following framework for blended learning to achieve the desired learning and teaching objectives.

There are five main dimensions of this frame work, pure e-learning, multimodal support, multimedia support, effective communication and virtual communities with further eight dimensions like technology, evaluation, process improvement, resources, ethical consideration , training and effective management. This frame work can be used by all three stake holders i.e. tutors, students and institutions for designing, evaluating, and implementing blended learning initiatives to make strategic decisions about the learning and teaching in higher education. The frame work is also very useful in helping to learn about blended learning design strategies.

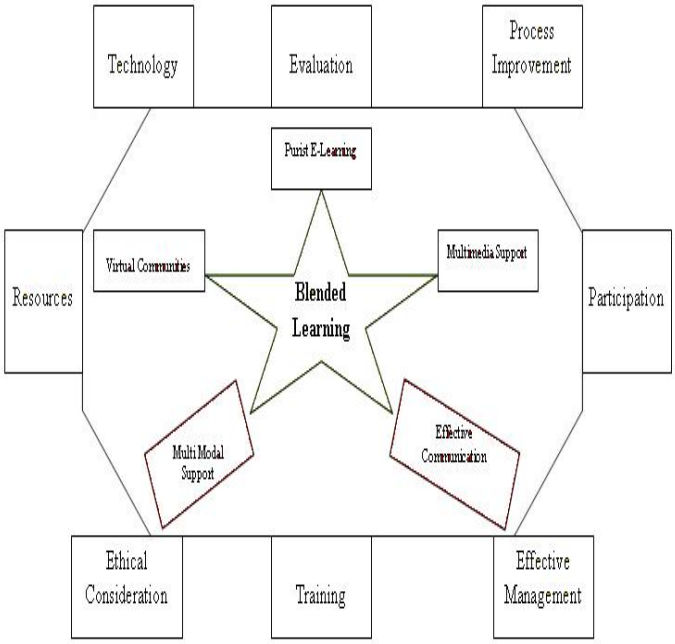

Figure 9. Blended Learning Framework.

Conclusion

This study has documented importance of technology and face to face tutoring in a virtual learning environment augmented within a blended learning environment frame work. But students and tutors will base there final analysis on the effectiveness of both e-learning and blended learning when given the opportunity on a large scale. This means that the academic institutions must be very clear and realistic about what they are delivering to the students and do not raise student's expectation too high. Recruiting large number of students based on good marketing strategy can be one good starting point for universities but the real success lies in the satisfaction and achievement of students. At the same time universities should provide necessary training to the tutors with all the latest technology and e-learning packages which are essential for teaching and tutors must also show enthusiasm to learn about new technology and use them in the teaching process. Academic institutions should also invest into research in the area of e-learning and blended learning. It is learning for all the three stake holders and no one should take it for granted.

REFERENCES

BECKETT, H. 2004. Blend skills for a better class of e-learning, *Computer Weekly*, January, p. 20.

BOURNER, T., FLOWERS, S. 1997. Teaching and learning methods in Higher Education: a glimpse of the future. *Reflections on Higher Education*, 9, pp. 77-102.

BADII, A., MOTHERSOL, P. 2007. *Towards reference architectures for dynamic pedagogic flow adaptation in blended learning with PCK-empowered MaestrOnto SCR and the P-Flow Control Support Framework.* Intelligent Media Systems and Services Research Centre, University of Reading, UK.

BLASS, E., DAVIS, A. 2003. Building on solid foundations: establishing criteria for e-learning development. *Journal of Further and Higher Education*, 27 (3), pp. 227-245.

CROSS, J. 2003. *How does it work.* Internet Time Group, Berkeley, California, USA, July.

DONOGHUE, J., SINGH, G., SINGH, J. 2002. Implication for planning e-learning strategy in Higher Education institutions. *Academic Education Quarterly*, 6 (4), pp. 77-82.

DELLANA, S. A., COLLINS, W. H., West, D. 2000. On-line education in a management science course: effectiveness and performance factors. *Journal of Education for Business*, 76 (1), pp. 43–47.

DANIELS, J. S. 1996. *Mega universities and knowledge media: technology strategies for Higher Education*. London: Routledge.

ELEARNERS, 2007. *What is the future of elearning.* Available at http://www.elearners.com/resources/elearning-faq7.asp

HAMEED, S., MELLOR, J. BADII, A., NIYATI, P., CULLEN, A. 2007. Factors mediating the routinisation of e-learning within a traditional university education environment. *International Journal of Electronic Business,* 5 (2), pp.160–175.

HAMEED, S., BADII, A., MELLOR, J. 2006. The impact of the increasing use of Instant Messaging (IM) on user's real social communication and integration. *International Journal on Transactions on Internet Research*, 2 (2), pp. 38-44.

HASERBOOK, J., HERRMANN, W,. RUDOLPH, D. 2003. Perspectives for European e–learning for businesses: markets, technologies and strategies, CEDEFOP, Luxembourg: Office for Official Publications of the European Communities, p. 90.

INGEBORG, B. 2005. *Lifelong learning means learning from cradle to grave*. Interview with Ingeborg Bø, President of the EDEN Network, by the users of elearningeuropa.info

JONES, M. E., SIMONETTI,J . L., VIELHABER-HEMON, M. 2000. Building a stronger organization through leadership development at Parke-Davis research. *Industrial and Commercial Training*, 32 (2), pp. 44-48.

KHAN, B. H. 2001. A framework for web-based learning. In B. H. Khan (ed.) *Web-based training*. Englewood Cliffs: Educational Technology Publications.

KLING, L. 2003. Online education in the USA: overview of a modern avenue for education delivery. *Industry and Higher Education*. 17 (5), pp. 365-374.

KLEIN, D, WARE, M. 2003. E-learning: new opportunities in continuing professional development. *Learned Publishing*, 16 (1), pp. 34-46.

LAURILLAD, D. 2001, The E-University: What have we learned? *International Journal of Management Education*, 1 (2), pp. 3-7.

LAURILLARD, D., ASHWIN, P. 2006. *Changing Higher Education: the development of learning and teaching.* London, Routledge.

LIM, D. H., MORRIS, L. M,. KUPRITZ, W. V. 2007. Online vs blended learning: difference in instructional outcomes and learner satisfaction. *Journal of Asynchronous Learning Networks,* 11 (2), pp. 38-50.

LIM, D. H. 2004. Fixed versus flexible learning: differences in learning, application, and instructional perception. *Proceedings of the 2004 Academy of Human Resource Development Annual Conference*. Austin, TX: Academy of HRD, pp. 1060–1066.

MALONE, A. S. 2003. *Learning about learning, an A-Z of training and development tools and techniques.* CIPD, London.

MALALA, J. N. 2004. *Psycho-socio dynamics of e-learning: investigating student's perception of efficacy in asynchronous computer generated learning.* University of Bradford, UK.

McCONNELL, D., LALLY, V. 2002. Developing, sustaining and researching e-learning groups and communities. Presented at *SCUTREA*, 32nd Annual Conference, 2-4 July, University of Stirling.

MAYADAS, F., PICCIANO, A. G. 2007. Blended learning and localness: the means and the end. *Journal of Asynchronous Learning Networks*, 11 (1), pp.12-26.

MULLICH, J. 2004. A Second Act for e-learning. *Workforce Management*, 83 (2), p. 51.

PICCIANO, A. G. 2006. Blended learning implication for growth and access. *Journal of Asynchronous Learning Networks*, 10 (3), pp. 215-232.

SHARPE, R., BENFIELD, G., ROBERTS, G., FRANCIS, R. 2006. *The undergraduate experience of blended e-learning: a review of UK literature and practice undertaken for the higher education academy*. Available online at www.heacademy.ac.uk/4884.htm

SONWALKER, N. 2002. A new methodology for evaluation: the pedagogical rating of online courses. *Syllabus*, 15 (6), pp. 18-21.

WALMSLEY, H. 2003. International bright young things. *Internet Magazine*, March, pp. 44, 45.